INVITATION TO BID	LSU	BID DUE DATE AND TIME
BOARD OF SUPERVISORS OF LOUISIANA STATE UNIVERSITY AND AGRICULTURAL & MECHANICAL COLLEGE		10/12/2005 11:00 am CT

SOLICITATION B6JPF0055

VENDOR #

VENDOR NAME AND ADDRESS

RETURN BID TO

Louisiana State University
Purchasing Office
213 Thomas Boyd Hall
Baton Rouge, LA 70803

BUYER James Frazier
BUYER PHONE 225-578-2306

ISSUE DATE 9/23/2005

TITLE: GPS EQUIPMENT

To Be Completed By Bidder

1. _____ "No Bid" (sign and return this page only).
2. _____ My Company does not wish to receive future solicitations for this commodity code.
3. Specify your Delivery: To be made within _____ days after receipt of order.
4. Specify your Payment Terms: _____.
   Prompt payment cash discounts for less than 30 days and less than 1% will be accepted, but will not be considered in determining awards. On indefinite quantity term contracts, cash discounts will be accepted and taken, but will not be considered in determining awards.
5. Specify your Bid Reference Number: _____.
   (This number will appear on any resulting order or contract.)

General Instructions to Bidders

1. Sealed bids for furnishing the items and/or services specified are hereby solicited, and will be received by the issuing LSU Campus/Department at the "Return Bid To" address stated above, until the specified due date and time.
2. Bids must be signed by a person authorized to bind the vendor. In accordance with Louisiana R.S. 39:1594, the person signing the bid must be: (1) a current corporate officer, partnership member, or other individual specifically authorized to submit a bid as evidenced in the appropriate records filed with the Louisiana Secretary of State; or (2) an individual authorized to bind the vendor as evidenced by a corporate resolution, certificate or affidavit; or (3) other documents indicating authority which are acceptable to the public entity.
3. Read the entire solicitation, including all terms, conditions and specifications.
4. All bid information and prices must be typed or written in ink. Any corrections, erasures or other forms of alteration to unit prices are to be initialed by the bidder.
5. Bid prices shall include all delivery charges paid by the vendor, F.O.B. LSU Destination, unless otherwise provided in the solicitation. Any invoiced delivery charges not quoted and itemized on the LSU purchase order are subject to rejection and non-payment.
6. Payment is to be made within 30 days after receipt of properly executed invoice, or delivery and acceptance, whichever is later. Delinquent payment penalties are governed by L.R.S. 39:1695.
7. By signing this solicitation, the bidder certifies compliance with all general instructions to bidders, terms, conditions and specifications; and further certifies that this bid is made without collusion or fraud.

BIDDER (Name of Firm)	MAILING ADDRESS
AUTHORIZED SIGNATURE	CITY, STATE ZIP
PRINTED NAME	PHONE #
TITLE	FAX #
E-MAIL	FEDERAL TAX ID #

SOLICITATION **B6JPF0055** DUE DATE **10/12/2005** DUE TIME **11:00 am**

These standard terms and conditions shall apply to all LSU solicitations, unless otherwise specifically amended and provided for in the special terms and conditions, specifications, or other solicitation documents. In the event of conflict between the General Instructions to Bidders or Standard Terms & Conditions and the Special Terms & Conditions, the Special Terms & Conditions shall govern.

Bids submitted are subject to provisions of the laws of the State of Louisiana, including but not limited to: the Louisiana Procurement Code (R.S. 39:1551-1736); Purchasing Rules and Regulations (Title 34 of the Louisiana Administrative Code); Executive Orders; and the terms, conditions, and specifications stated in this solicitation.

1. **Bid Delivery and Receipt**
   To be considered, sealed bids must be received and time-stamped at the "Return Bid To" address no later than the due date and time specified herein. Sealed bids cannot be accepted by telegraph, fax, or e-mail. Price alterations and addenda to bids may be submitted by telegraph or fax, and will be considered provided bidder's sealed bid, price alterations and addenda have been received in the purchasing office prior to bid opening time. Late bids cannot be accepted per L.A.C. 34.I.517, and shall be returned unopened.
2. **Bid Forms**
   Bids are to be submitted on and in accordance with the LSU solicitation forms provided, and must be signed by an authorized agent of the vendor. Bids submitted on other forms or in other price formats may be considered informal and may be rejected in part or in its entirety. Bids submitted in pencil and/or bids containing no original signature indicating the bidder's intent to be bound will not be accepted.
3. **Interpretation of Solicitation/Bidder Inquiries**
   If bidder is in doubt as to the meaning of any part or requirement of this solicitation, bidder may submit a written request for interpretation to the Buyer-of-Record at the address and/or fax number shown above. Written inquiries must be received in the LSU Purchasing Office no later than five (5) calendar days prior to the opening of bids, and shall be clearly cross-referenced to the relevant solicitation/specification in question.
   No decisions or actions shall be executed by any bidder as a result of oral discussions with any LSU employee or consultant. Any interpretation of the documents will be made by formal addendum only, issued by the LSU Purchasing Office, and mailed or delivered to all bidders known to have received the solicitation. LSU shall not be responsible for any other interpretations or assumptions made by bidder.
4. **Bid Opening**
   Bidders may attend the public bid opening of sealed bids and proposals. No information or opinions concerning the ultimate contract award will be given at bid opening or during the evaluation process. Written bid tabulations will not be furnished. Bids may be examined within 72 hours after bid opening. Information pertaining to completed files may be secured by visiting the LSU Purchasing Office during normal working hours.
5. **Special Accommodations**
   Any "qualified individual with a disability" as defined by the Americans with Disabilities Act, who has submitted a bid and desires to attend the public bid opening, must notify the LSU Purchasing Office in writing not later than seven days prior to the bid opening date of their need for special accommodations. If the request cannot be reasonably provided, the individual will be informed prior to the bid opening.
6. **Standards of Quality**
   Any product or service bid shall conform to all applicable federal, state and local laws and regulations, and the specifications contained in the solicitation. Any manufacturer's name, trade name, brand name, or catalog number used in the specification is for the purpose of describing the standard of quality, performance, and characteristics desired; and is not intended to limit or restrict competition. Bidder must specify the brand and model number of the product offered in his bid. Bids not specifying brand and model number shall be considered as offering the exact product specified in the solicitation.
7. **New Products/Warranty/Patents**
   All products bid for purchase must be new, never previously used, of the manufacturer's current model and/or packaging, and of best quality as measured by acceptable trade standards. No remanufactured, demonstrator, used or irregular products will be considered for purchase unless otherwise specified.
   The manufacturer's standard published warranty and provisions shall apply, unless more stringent warranties are otherwise required by LSU and specified in the solicitation. In such cases, the bidder and/or manufacturer shall honor the specified warranty requirements, and bid prices shall include any premium costs of such coverage.
   Bidder guarantees that the products proposed and furnished will not infringe upon any valid patent or trademark; and shall, at its own expense, defend any and all actions or suits charging such infringement, and shall save LSU harmless.
8. **Descriptive Information**
   Bidders proposing an equivalent brand or model are to submit with the bid descriptive information (such as literature, technical data, illustrations, etc) sufficient for LSU to evaluate quality, suitability, and compliance with the specifications. Failure to

submit descriptive information may cause bid to be rejected. Any changes made by bidder to a manufacturer's published specifications shall be verifiable by the manufacturer. If items bid do not fully comply with specifications, bidder must state in what respect items deviate. Bidder's failure to note exceptions in its bid will not relieve the bidder from supplying the actual products requested.

9. Bids/Prices/F.O.B. Point

- The bid price for each item is to be quoted on a "net" basis and F.O.B. LSU Destination, i.e. title passing upon receipt and inclusive of all delivery charges, any item discounts, etc.
- Bids other than F.O.B. LSU Destination may be rejected.
- Bids indicating estimated freight charges may be rejected.
- Bids requiring deposits, payment in advance, or C.O.D. terms may be rejected.
- Bidders who do not quote "net" item prices and who separately quote an overall "lump sum" freight cost or discount for all items shall be considered as submitting an "all-or-none" bid for evaluation and award purposes; and risk rejection if award is made on an item basis.
- Prices shall be firm for acceptance for a minimum of 30 days, unless otherwise specified. Bids conditioned with shorter acceptance periods may be rejected.
- Prices are to be quoted in the unit/packaging specified (e.g. each, 12/box, etc), or may be rejected.
- In the event of extension errors, the unit price bid shall prevail.

10. Taxes

Vendor is responsible for including all applicable taxes in the bid price. LSU is exempt from all Louisiana state and local sales and use taxes. By accepting an award, resident and non-resident firms acknowledge their responsibility for the payment of all taxes duly accessed by the State of Louisiana and its political subdivisions for which they are liable, including but not limited to: franchise taxes, privilege taxes, sales taxes, use taxes, ad valorem taxes, etc.

11. Terms and Conditions

This solicitation contains all terms and conditions with respect to the purchase of the goods and/or services specified herein. Submittal of any contrary terms and conditions may cause your bid to be rejected. By signing and submitting a bid, vendor agrees that contrary terms and conditions which may be included in its bid are nullified; and agrees that this contract shall be construed in accordance with this solicitation and governed by the laws of the State of Louisiana.

12. Vendor Forms/LSU Signature Authority

The terms and conditions of the LSU solicitation and purchase order/contract shall solely govern the purchase agreement, and shall not be amended by any vendor contract, form, etc.

The University's chief procurement officer, or authorized designee, is delegated sole authority to execute/sign any vendor contracts, forms, etc, on behalf of LSU. Departments are expressly prohibited from signing any vendor forms.

Any such vendor contracts/forms bearing unauthorized signatures shall be null and void, shall have no legal force, and shall not be recognized by LSU in any dispute arising therefrom. Vendors who present any such forms to department users for signature without regard to this strict LSU policy may face contract cancellation, suspension, and/or debarment.

13. Awards

Award will be made to the lowest responsible and responsive bidder. LSU reserves the right: (1) to award items separately, grouped, or on an all-or-none basis, as deemed in its best interest; (2) to reject any or all bids and/or items; and (3) to waive any informalities.

All solicitation specifications, terms and conditions shall be made part of any subsequent award as if fully reproduced and included therein, unless specifically amended in the formal contract.

14. Acceptance of Bid

Only the issuance of an official LSU purchase order/contract, a Notification of Award letter, or a Notification of Intent to Award letter shall constitute the University's acceptance of a bid. LSU shall not be responsible in any way to a vendor for goods delivered or services rendered without an official purchase order/contract.

15. Applicable Law

All contracts shall be construed in accordance with and governed by the laws of the State of Louisiana.

16. Awarded Products/Unauthorized Substitutions

Only those awarded brands and numbers stated in the LSU contract are approved for delivery, acceptance, and payment purposes. Any substitutions require prior approval of the LSU Purchasing Office. Unauthorized product substitutions are subject to rejection at time of delivery, post-return at vendor's expense, and non-payment.

17. Testing/Rejected Goods

Vendor warrants that the products furnished will be in full conformity with the specification, drawing or sample, and agrees that this warranty shall survive delivery, acceptance, and use. Any defect in any product may cause its rejection. LSU reserves the right to test products for conformance to specifications both prior to and after any award. Vendor shall bear the cost of testing

if product is found to be non-compliant. All rejected goods will be held at vendor's risk and expense, and subject to vendor's prompt disposition. Unless otherwise arranged, rejected goods will be returned to the vendor freight collect.

18. Delivery

Vendor is responsible for making timely delivery in accordance with its quoted delivery terms. Vendor shall promptly notify the LSU Department and/or Purchasing Office of any unforeseen delays beyond its control. In such cases, LSU reserves the right to cancel the order and to make alternative arrangements to meet its needs.

19. Default of Vendor

Failure to deliver within the time specified in the bid/award will constitute a default and may be cause for contract cancellation. Where the University has determined the vendor to be in default, LSU reserves the right to purchase any or all goods or services covered by the contract on the open market and to surcharge the vendor with costs in excess of the contract price. Until such assessed surcharges have been paid, no subsequent bids from the defaulting vendor will be considered for award.

20. Vendor Invoices

Invoices shall reference the LSU purchase/release order number, vendor's packing list/delivery ticket number, shipping/delivery date, etc. Invoices are to be itemized and billed in accordance with the order, show the amount of any prompt payment discount, and submitted on the vendor's own invoice form. Invoices submitted by the vendor's supplier are not acceptable.

21. Delinquent Payment Penalties

Delinquent payment penalties are mandated and governed by Louisiana R.S. 39:1695. Vendor penalties to the contrary shall be null and void, shall have no legal force, and shall not be recognized by LSU in any dispute arising therefrom.

22. Assignment of Contract/Contract Proceeds

Vendor shall not assign, sublet or transfer its contractual responsibilities, or payment proceeds thereof, to another party without the prior written consent and approval of the LSU Purchasing Office. Unauthorized assignments of contract or assignments of contract proceeds shall be null and void, shall have no legal force, and shall not be recognized by LSU in any dispute arising therefrom.

23. Contract Cancellation

LSU has the right to cancel any contract for cause, in accordance with purchasing rules and regulations, including but not limited to: (1) failure to deliver within the time specified in the contract; (2) failure of the product or service to meet specifications, conform to sample quality or to be delivered in good condition; (3) misrepresentation by the vendor; (4) fraud, collusion, conspiracy or other unlawful means of obtaining any contract with the University; (5) conflict of contract provisions with constitutional or statutory provisions of state or federal law; (6) any other breach of contract.

LSU has the right to cancel any contract for convenience at any time by giving thirty (30) days written notice to the vendor. In such cases, the vendor shall be entitled to payment for compliant deliverables in progress.

24. Prohibited Contractual Arrangements

Per Louisiana R.S. 42:1113.A, no public servant, or member of such a public servant's immediate family, or legal entity in which he has a controlling interest shall bid on or enter into any contract, subcontract, or other transaction that is under the supervision or jurisdiction of the agency of such public servant. See statute for complete law, exclusions, and provisions.

25. Equal Employment Opportunity Compliance

By submitting and signing this bid, vendor agrees to abide by the requirements of the following as applicable: Title VI and VII of the Civil Rights Act of 1964, as amended by the Equal Opportunity Act of 1972; federal Executive Order 11246; federal Rehabilitation Act of 1973, as amended; the Vietnam Era Veteran's Readjustment Assistance Act of 1974; Title IX of the Education Amendments of 1972; the Age Act of 1975; the Americans with Disabilities Act of 1990. Vendor agrees not to discriminate in its employment practices, and will render services under any contract entered into as a result of this solicitation without regard to race, color, religion, sex, age, national origin, veteran status, political affiliation, handicap, disability, or other non-merit factor. Any act of discrimination committed by vendor, or failure to comply with these statutory obligations when applicable, shall be grounds for termination of any contract entered into as a result of this solicitation.

26. Mutual Indemnification

Each party hereto agrees to indemnify, defend, and hold the other, its officers, directors, agents and employees harmless from and against any and all losses, liabilities, and claims, including reasonable attorney's fees arising out of or resulting from the willful act, fault, omission, or negligence of the indemnifying party or of its employees, contractors, or agents in performing its obligations under this agreement, provided however, that neither party hereto shall be liable to the other for any consequential damages arising out of its willful act, fault, omission, or negligence.

27. Certification of No Suspension or Debarment

By signing and submitting this bid, bidder certifies that its company, any subcontractors, or principals thereof, are not suspended or debarred under federal or state laws or regulations. A list of parties who have been suspended or debarred by federal agencies is maintained by the General Services Administration and can be viewed on the internet at www.epls.gov.

ITEM	QTY	UNIT	DESCRIPTION	UNIT PRICE	EXTENSION
0001	15	EA	NETRS CONTINOUSLY OPERATING GPS REFERENCE STATIONS (CORS) WITH ZEPHYR GEODETIC ANTENNA & POWER SUPPLY FOR 110V OPERATION WITH 1GB CF CARD, OR EQUAL. ****** ADDITIONAL SPECIFICATIONS ATTACHED ****** QUOTING#_____MFD.BY_____	_____	_____
0002	1	EA	GPS CAMPAIGN SYSTEM INCLUDES RECEIVER, GEODETIC ANTENNA, DOWNLOAD CABLE, A/C POWER SUPPLY, BATTERY CABLE, TRANSPORT CASE, INTERNAL BATTERIES, ACCESSORIES FOR OPERATION, EXTENSION POLE & 10M CABLE, OR EQUAL. ****** ADDITIONAL SPECIFICATIONS ATTACHED ****** QUOTING#_____MFD.BY_____	_____	_____
0003	1	EA	GPS CAMPAIGN RTK UPGRADE INCLUDES DATA COLLECTOR, ZEPHYR GPS ANTENNA, BACKPACK, BASE UHF RADIO MODEM, INTERNAL ROVER UHF RADIO, RADIO ANTENNA, OR EQUAL. ****** ADDITIONAL SPECIFICATIONS ATTACHED ****** QUOTING#_____MFD.BY_____	_____	_____
		NOTE:	A PREFERENCE, IF APPLICABLE, MAY BE ALLOWED FOR PRODUCTS PRODUCED, MANUFACTURED, ASSEMBLED, GROWN OR HARVESTED IN LOUISIANA. DO YOU CLAIM THIS PREFERENCE? YES _____ NO _____ NOTE: PREFERENCES SHALL NOT APPLY TO SERVICE CONTRACTS. IS YOUR LOUISIANA BUSINESS WORKFORCE COMPOSED OF A MINIMUM OF FIFTY PERCENT LOUISIANA RESIDENTS? YES _____ NO _____ SPECIFY ITEM NUMBER AND LOCATION WITHIN LOUISIANA WHERE THE PRODUCT IS/WAS PRODUCED, MANUFACTURED, ASSEMBLED, GROWN OR HARVESTED: _____ NOTE: THIS PREFERENCE IS NOT APPLICABLE FOR SERVICES.		
		NOTE:	AWARD TO BE MADE ON AN ALL-OR-NONE BASIS.		

ITEM #1:

GPS CORS Receiver Bid Specifications

The specification below outlines the requirements for a dual frequency (L1/L2) GPS CORS receiver that is internet ready. It must include Geodetic Quality Antenna and power supply needed for 11OV Electric Connection. The system must be equivalent to Trimble Zephyr geodetic antenna. Reference part number 48648-62

System Requirements

- Advanced Maxwell 5 custom chip
- R-track technology for L2C signal tracking capability1
- High precision multiple correlator for L1 and L2 pseudorange measurements
- Unfiltered, unsmoothed pseudorange measurements data for low noise and low multipath error
- Very low noise L1 and L2 carrier phase measurements
- 24 Channels L1 C/A Code, L2C1, L1/L2Full Cycle Carrier WAAS/EGNOS
- External frequency input
-

Data storage Requirements

Memory

- 150 MB internal, 3400 hours of raw data observables based on recording data from satellites at 15 sec epoch

Accuracy Requirements

Static

- 5 mm + 1 ppm horizontal RMS and 10 mm + 1 ppm vertical RMS

Electrical Requirements

- 11–28 VDC external power input with over-voltage protection
- Power consumption
  - less than 3 Watts for NetRS
  - 3.5 Watts with a Dorne & Margolin choke ring antenna
  - 4.0 Watts with a Zephyr Geodetic™ antenna

Size and weight Requirements

- Size . . . . . 22.8 cm W x 6.5 cm H x 14 cm D (9 in W x 2.6 in H x 5.5 in D)
- Weight. . . . . 1.6 kg (3.5 lbs)

Environment Requirements

- Operating temperature. . . . . –40 °C to +65 °C (–40 °F to +149 °F)
- Storage temperature . . . . . –40 °C to +75 °C (–40 °F to +167 °F)
- Waterproof to IPX5
- Fully sealed from sand, dust and moisture
- Humidity . . . . . 100% non-condensing

Shock and vibration Requirements

- MIL-810-F Figure 514 5c-17 vibration levels on each axis
- Shock tested to MIL-810-F Table 516.5-I to survive a 2 m (6.56 ft) drop onto hard surface

Communication Requirements

- 1 LAN port
  - 1 port with RJ45 connector supports links to 10BaseT/100BaseT networks
  - All functions are performed through a single IP address simultaneously—including web GUI access, FTP file transfer, and RT17 streaming
- 4 RS232 ports
  - One or more serial ports can be used simultaneously for local CMR or RTCM correction transmission or a remote PPP dial-up through a modem supporting all the same functions as are available through the 10BaseT/100BaseT port

Positioning and outputs Requirements

- 1 Hz, 2 Hz, 5 Hz and 10 Hz positioning, internal logging and data streaming outputs
- RT-17 outputs
- CMR and RTCM 2.1, 2.3 outputs

Control software Requirements

- HTML web browser. . . . . Internet Explorer v 5.0 or newer and Netscape v 4.78 or newer

Antenna Requirements (must be able to accept the following:)

- Zephyr Geodetic and rover, and EDO Dorne & Margolin Choke Ring Antenna

Certifications Requirements

- Class B Part 15 FCC certification, CE Mark approval, and C-tick approval

ITEM #2:

GPS Receiver Bid Specifications

The specification below outlines the requirements for a dual frequency (L1/L2) GPS/WAAS/EGNOS/L2C receiver.

Physical Requirements of the GPS Reciever

Size of GPS Receiver

- The maximum dimensions, with or without the receive only radio must be 14.5cm W x 8.9cm H x 23.9cm D (5.7" W x 3.5" H x 9.4" D)

Weight with Radio and Battery Charger

- The GPS receiver with internal radio modem, two batteries and battery charger and UHF antenna must not exceed 1.4kg (3.0lbs).
- The complete Real Time Kinematic (RTK) rover weight must not be more than 4.0kg (8.8lbs).
  Included : radio modem and antenna, range pole, 2 internal batteries for at least 7 hours, battery charger, hand held data collector and bracket and cable, GPS receiver, compact flashcard , Standard GPS antenna and cable.
- The GPS receiver should be operated using the following configurations:
  - mounting on the pole;
  - in the receiver shoulder /belt carry pouch;
  - or in a backpack
- Range Pole must weigh no more than 0.75kgs (1.66 lbs)
- Backpack must weigh no more than 1.5kgs (3.3 lbs)
- Receiver pouch, or Belt bag option must weigh no more than 0.4kgs (0.9 lbs)
- Geodetic GPS Antenna must weigh no more than 1.29kgs (2.8 lbs)
- Standard GPS Antenna must weigh no more than 0.54 kg (1.2 lbs)

Weight without Radio

- The GPS receiver weight without an internal radio must be no more than 1.2kg (2.6lbs)
- The complete Kinematic rover weight must be no more 2.7kg (6.0 lbs)
  Included : 2 internal batteries, battery charger, hand-held data collector and cable, GPS receiver, compact flashcard, Standard GPS antenna and cable.
- The GPS receiver should be operated using the following configurations:
  - mounting on the pole;
  - in the receiver shoulder /belt carry pouch;
  - or in a backpack
  - on a tripod
- Range Pole must weigh no more than 0.75kgs (1.66 lbs)
- Backpack must weigh no more than 1.5kgs (3.3 lbs)
- GPS Receiver pouch, or Belt bag option must weigh no more than 0.4kgs (0.9 lbs)
- Geodetic GPS Antenna must weigh no more than 1.29kgs (2.8 lbs)
- Standard GPS Antenna must weigh no more than 0.54 kg (1.2 lbs)

Environmental Requirements of the GPS Reciever

Environmental Requirements

- The GPS antenna and receiver must be rugged and suitable for use in field environments that may be hot, cold, wet or dusty.
- The GPS receiver must pass Military specifications described by MIL-SPEC-810 for wind driven rain, snow and dust
- The GPS receiver electronics must be fully sealed from sand, dust and moisture.
- The GPS receiver must be made of tough lightweight metal (non-plastic)
- The GPS antenna must be shockproof for a drop onto a hard surface from a height of 2m (6.6ft)
- The GPS receiver must be tested and pass shock of 40G random using Military specifications MIL-SPEC-810 rev F Figure 514.5c-17.
- The GPS receiver must be withstand an accidental drop of 1m (3.28 ft) drop on hard surface.
- The GPS receiver vibration levels must sustain vibrations for one hour on each axis using MIL-SPEC-810 F table 516.5-I levels for 3 shocks each axis, each direction (total of 18 shocks) while operating.
- The GPS receiver: must be able to operate to measurement specification in temperatures between -40° to +65°C (-40°F to +149°F)
- The GPS receiver must be not less than 100% condensing humidity proof.
- The GPS receiver must be able to be submerged to a depth of 1m (3.2 ft) without water effecting the equipment.
- The GPS receiver must be waterproof tested to IPX7 protection classifications according to DIN 40 050 / IEC 529 – definition of indexes
- The GPS receiver must be buoyant in water.
- The GPS receiver must be able to be transported or stored in the following temperature range without sustaining damage to the equipment -40° to +80°C (-40°F to 176°F)
- The GPS receiver connectors fully seal the receiver when a like connector is attached
- The GPS receiver must be supplied with integral dust caps to protect the connector when no cable is connected

Power Requirements of the GPS Reciever

Power Requirements

- The GPS receiver must have a nominal voltage range of 11.5-28 VDC
- The GPS receiver must have two DC external power inputs and two DC internal power inputs.
- The GPS receiver must include over-voltage protection on all power inputs.
- The GPS receiver must allow for power inputs of up to 28 V and greater without sustaining damage.
- The GPS receiver must have nominal power consumption of 2.5W @ 8.4V (1800mAh) while powering the dual frequency GPS antenna.
- The GPS receiver must have nominal power consumption of 3.75W @ 8.4V (1800mAh) while powering the dual frequency RTK, GPS antenna and the internal radio modem.
- The GPS receiver must be able to recharge the batteries internally using an external power source.
- The GPS receiver output power must range 10.5 V- 27.5V through two designated ports.

Intelligent Power Management

- The system must turn on automatically when connected to a DC source that is produced by the manufactures AC power supply.
- The system must have two power input ports internally to support removable rechargeable batteries
- The system must have two power input ports externally to support a variety of external power sources
- The system must automatically swap between power sources due to a low battery or battery removal without any effect on the survey. There must not be a cycle slip or a new logging file created.
- It must be possible to power on the system remotely by sending an RS-232 break signal.
- There must be a visual indicator for each of the two power ports on the receiver to indicate low battery.

Detail level for Intelligent Power Management

- After a power failure the system must restart with the same settings and configurations that were used before the power failure, for operational recovery without need for user intervention.
- When the receiver is recharging the internal batteries it must intelligently chose which internal battery to charge
- When a power source is removed the receiver must automatically swap to the next best power source available without effect to the data being stored

Power output

- It is required that power be provided from the system power source to the TSC1 handheld unit at all times when the system is functioning.
- The GPS receiver power supply must be able to supply at least 0.4A.
- The GPS receiver output power must range 10.5 V- 27.5V

Power Batteries - Standard Removable Internal Rover Battery

- The supplied internal batteries must be removable from the receiver
- The supplied internal battery must be a fully sealed battery.
- The weight of the combined internal GPS receiver batteries for >7 hours survey operation, must not exceed 0.2kgs (0.45 lbs)
- The internal battery/batteries must be protectively enclosed from the environment within the receiver
- Each battery must power the GPS receiver in post processing mode for at least 5 hours each
- Two internal batteries must power the entire roving RTK system (includes radio modem and antenna, battery charger, hand held data collector, cables, GPS receiver, GPS antenna). for at least a full >7 hour day.

Power Batteries - External Base Battery

- The external battery must be able to provide power to the GPS receiver only for at least >20 hours at room temperature.
- The external battery must be a fully sealed battery.
- The external battery must be packaged in a way that easily portable.
- The cable to connect the external battery to the GPS receiver unit must be an integral part of the battery.
- The battery must be fused for safety and have a spare fuse within the battery housing.
- The battery within the packaging must be a standard battery that can be replaced by the user.
- The external battery must not weigh more than 2.95kgs (6.5 lbs)

Power Batteries - External Car Battery

- It must be possible to use any 12 Volt Lead Acid battery must be able to be used with the system.
- The manufacturer must be able to supply a cable that allows for the system to be used from a car battery for extended operation.

Memory Requirements of the GPS Receiver

Internal Data Storage

- The GPS receiver must have internal removable data storage, fully protected from sand, dust, moisture and 100% non condensing humidity proof.
- The internal removable memory must be able log L1/L2 data continuously for >55 days ie : 1340 hours @ 6Svs and storing at 15 sec intervals using a 48MB compact flashcard / >104 days ie : 2500 hours @ 6Svs and storing at 15 sec intervals)using 96MB compact flashcard.

- Data must be stored in flash memory, so that no battery backup is required for the data storage memory.
- Compact flashcard must be able to be formatted by the GPS receiver using the front panel of the GPS receiver not by an external device such as a data collector or a personal computer
- Compact flashcard must be able to contain preprogrammed application files for the GPS receiver
- Compact flashcard must be able to contain GPS receiver firmware upgrade and be able to load upgrade in no more than 120 seconds.
- Download software for an IBM compatible PC running Windows 95/98/2000/NT V4.0 or above must be provided.
- When data is deleted using an external controller or PC, the files must be recoverable at a later date if the memory has not been used for storage of new data. The reuse of data storage used by previously deleted files must be on a first in first out basis. The system must never automatically delete files.
- External data storage must be possible using an external hand held survey data collector in either internal memory or using a PC card - or Windows95/98/2000/NT based data logging software.
- The receiver must not require a PC card to be present in order to operate and output RTK positions on a serial port.

Antenna Requirements of the GPS Receiver

Geodetic GPS antenna

- The GPS antenna must be cable of receiving both L1 (1575.42Mhz) and L2 (1227.6)MHz Frequencies
- The GPS antenna must weigh no more than 1.29kgs (2.84lbs)
- The GPS antenna maximum dimensions should be no greater than dia 34.3cm x 7.6cm H (dia 13.5" x 3.0" H)
- Tha GPS antenna must operate in the following temperature range -40°C to +70°C (-40°F to 158°F)
- The GPS antenna must be able to be transported and stored in the following temperature range -55°C to +85°C (-67°F to 121°F)
- The GPS antenna must pass the following environmental standards MIL-810-F Figure 514.5c-17 vibration levels on each axis, Shock tested table MIL-810-F Table 516.5-I a 2m (6.56ft)drop
- The GPS antenna must be sealed and 100% humidity proof protected against Dust, Wind, Rain, Sand and Snow
- The GPS antenna must have a 4-point antenna feed for sub-millimeter phase center error and enhanced right-hand circular polarization.
- The GPS antenna should provide low elevation tracking technology
- The GPS antenna must have an phase center with a <1mm precision stability.
- The GPS antenna must be high gain of at least 50dB in both L1 and L2 frequencies
- The GPS antenna must have a TNC connector for cable connection
- The GPS antenna must have a ground plane at least 30cm (11.8") in diameter to reduce ground based multipath.
- The GPS antenna must use a resistivity tapered method for L1 and L2 eccentricities

Receive Radio Antenna (for RTK GPS functionality)

- A standard TNC connector must be provided for connection to the radio antenna. Connectors other than TNC connectors are not acceptable. Internal antennae are not accepted.
- Radio must be able to be able to receive RTCM or RTK broadcast data through any receiver serial port.
- The GPS receiver must be able to interface and broadcast using 3rd party external radios

Interfaces

- The GPS receiver must have three RS232 ports for serial input/output and data collector control.
- The GPS receiver must have two external ports available for power input.
- The GPS receiver must have an integral USB port for data transfer capable of handling 1 megabit per second
- The GPS receiver must have three ports capable of handling baud rates up to 115,200.
- The GPS receiver must have flow control on at least one port.
- There must be a single cable that provides power and RS-232 communications in an office environment.
- The GPS receiver must be capable of single event marking
- The GPS receiver must be capable of dual event marking on two ports simultaneously
- The GPS receiver must be capable of 1PPS output
- The system must be capable of charging internal batteries via two external ports during observation of GPS data

Display

- System must have a method for indicating the following information without requiring a separate hand held unit.
- The system receiver must indicate if the supplied power is acceptable or low.
- The system must indicate which power port is in use.
- The system must indicate the status of the battery in use, as well as the status of a second connected battery that is not in use.
- The system must indicate the time of event for single or dual event marking
- The system receiver must indicate that satellites are being tracked. This must indicate if the system receiver is tracking 4 or more satellites, less than 4 satellites or no satellites.
- When a hand held unit is not being used, the system receiver must indicate if data is being logged into the internal memory.
- When a hand held unit is not being used, the system receiver must include an indicator to inform of a low memory situation in the receiver.
- When a hand held unit is not being used, the system receiver warning of low memory must be such that, when performing a fast static survey, the current observation can be finished before the memory becomes full.
- The system must display that radio signal has been accepted from a broadcasting radio on the same frequency as the receivers internal radio.

Keyboard

- The GPS receiver must have two keys
- The GPS receiver must have a simple one key power on must be available without the requirement of an external data collector or PC
- The GPS receiver must have a simple one key operation is required for data logging without the requirement of an external data collector or PC
- The GPS receiver must have a simple one key operation to format the removable internal flashcard must be available.
- In the field, the user must be able to reset the unit, using single key operation , without using an external controller or PC.

Regulations (that must be displayed)

- United States of America, the receiver must be Class B Part 15 FCC certification
- Canada certified by the Canadian Federal Communication Commission (FCC)

- European Certification CE Mark approved
- The instrument must pass and display the Australian Communications Authority C-Tick mark.

GPS Signal

Tracking

- The GPS receiver must be capable of tracking the L2C signal.
- When Anti-Spoofing (A/S) (P-code encryption) is activated, the receiver must measure L1 C/A pseudo ranges, L2 range measurements and the full cycle L1 and L2 carrier phases.
- The GPS receiver must provide unfiltered and unsmoothed psudorange data for low noise, low mulitpath error, low time delay correlation and high dynamic response
- The performance of the system must not be lower during times when A/S is activated, compared to during times when A/S is not activated.
- Extremely low noise C/A code tracking technology and multipath Mitigation techniques are required in the receiver.
- Time from power on to acquisition of all L1 and L2 signals available: <30 seconds (with recent ephemeris).
- Re-acquisition time of all L1 and L2 signals in view after an interruption in visibility <15 seconds.
- Signal-to-noise (SNR) ratio values must be reported for L1 and L2 tracking for all satellites, in Decibel / Hz (dB/Hz) referenced to a 1 Hz bandwidth.
- SNR values must be reported in the same units for L1 and L2 and using the same algorithm
- SNR values must be available both via the visual display and via ASCII output in real time

Channels

- The GPS receiver must be able to track L1 and L2 on 12 satellites simultaneously
- The GPS receiver must have a total of 24 channels

RF Section

- The GPS receiver must use multibit aided analog to digital (A/D) sampling.
- The GPS receiver must have technology that enhances low power satellite signal acquisition. This technology must increase the GPS receiver's ability to maintain a firm lock on signals once acquired. It must provide improved tracking in areas of high radio interference such as under power lines, around airports, near radio-intensive construction sites. The technology must also increase the ability to work near trees with minimal signal lock loss.
- The receiver must use SAW filter technology.

WAAS / EGNOS / MSAS tracking

- The GPS receiver must capable of tracking a WAAS / EGNOS / MSAS satellite for real time free of cost differential positioning and base station location.
- This must not require any additional hardware or firmware options nor the use of an additional antenna.

Precision requirements

General

- When using conventional RTK typical maximum coverage area must be no less than 300sq km(115 sq mi) per base
- When Single Base eRTK is being used the maximum coverage area must be no less than 1250sq km(500 sq mil)
- When Mulitple Base TDMA eRTK is being used maximum coverage area must be no less than 3750sq km (1500sq mi)
- When using Virtual Reference Station eRTK the maximum coverage area must be no less than 8500sq km (3300sq mi)

- The manual documentation must provide directions on how to achieve the stated precisions. These directions must follow standard GPS surveying procedures.

Accuracy

- When the correct number of satellites are visible, there are minimal or no obstructions, there is minimal multipath or ionospheric activity and the reference station position is correct, the system must perform as specified. .
- The GPS receiver must have the following precisions
    - RTK(OTF) precision must be no less than:
        - Horizontal Accuracy 1cm + 1ppm (x baseline length) RMS
        - Vertical Accuracy 2cm + 1ppm (x baseline length) RMS
        - Latency > 100 ms
    - Th GPS receiver must have the following Static / Fast Static precisions:
        - Horizontal Accuracy 5mm + 0.5ppm (x baseline length) RMS,
        - Vertical Accuracy 5mm + 1ppm (x baseline length) RMS
    - The GPS receiver must have the following WAAS solution precisions:
        - ~~Horizontal Accuracy Less than $5m^3$ RMS~~
        - Vertical Accuracy Less than $5m^3$ RMS
- The GPS receiver when used in a real time Kinematic survey must be able to initialize automatically while moving, with a reliability of >= 99.9%.
- Minimal Initialization time should be within 10 sec + 0.5 x baseline length
- The GPS receiver must have an Azimuth accuracy of +/- 1 arc second + 5/ baseline length in kilometers

Operational requirements

Logging

- The GPS receiver must be capable of logging data at operator selected intervals of 0.1, 0.2. 0.5, 1, 2, 5, 10, 15, 30 and 60 seconds.
- The GPS receiver must be capable of logging data NMEA logging intervals of 0.05, 0.1, 0.2. 0.5, 1, 2, 5, 10, 15, 30 and 60 seconds.
- When used without a external controller the system must log at the rate recommended by the manufacturer for Static Processing.
- The GPS receiver must automatically return to default parameters (i.e. elevation mask, PDOP mask) when powered on.

Techniques

- The GPS receiver must be capable of performing Static, Fast Static, Kinematic, and Real Time Kinematic surveys, when used with a hand-held controller.
- When used without a hand-held controller data collected must be able to be processed as Static or continuous Kinematic data within the manufacturers centimeter level processing system.

Static/FastStatic Survey Operation

- Surveys must be able to be performed in the following modes:
- One Button Survey. This is defined as the user is only required to turn the GPS receiver on for the survey to take place. All default settings will ensure that data is logged to an automatically named file.
- Externally Controlled. This must allow for full control and status information of the survey process via a hand held controller.
- For Kinematic Survey Operation, surveys must be able to be performed in the following modes:
- Postprocessed Continuous survey
- Stop & Go survey
- Real Time Kinematic
- Stop-&-go and Continuous
- During an RTK survey, the GPS receiver must also be able to collect raw data when the radio link is broken for postprocessed infill later in the office.

Multiple Base Station RTK on a single radio frequency

- It must be possible to operate with and up to 4 reference stations on a single radio frequency
- All 4 reference stations must be able to send their data once per second in a unique 1/4 second slot - without interfering with each other, even if they are within radio range.

Radios

Cellular Telephone

The receiver must be capable of using a data modem capable cellular telephone, or cellular digital packet data modem for the RTK link.

Internal Radio

- The GPS receiver must come with an integrated high gain UHF receive only radio system.
- Radios must be available in 12.5 and 25 KHz channel spacing.
- The internal radio must be capable of storing up to user programmable 20 frequencies in preset channels.
- It must be possible to change radio channel using the handheld controller.
- The actual radio frequency in Mhz must be visible on the handheld controller when changing radio frequency.
- Internal radio frequencies must span at least 20MHz

Base/Rover Radio

- The radio must have an integrated scanner for determining which frequency has the least amount of interference.
- The radio must have a minimum 4800bps over air baud rate.
- At least two repeaters must be able to be used with the system. The repeated information must be on the same frequency as the original data. Frequency changing repeater systems will not be accepted.
- The radio must be available in the following lower power consuming radio capability is used if the application requires it:
- 2 watt, 10 watt, 25 watt solution.
- Wattage solutions must be user selectable from the front panel.
- The user must be able to change the radio channel without the use of an external device.
- The base radio must be available with 16 preset channels.

Other requirements

Options

- RTCM Input Version 2.2 must be standard with the GPS receiver.
- RTK OTF must be standard with the system.
- At least fourteen NMEA type sentences must be supported, including the following NMEA message types: GGA, GST, GSV, PTNL GGK, PTNL GGK_SYNC, PTNL PJK, PTNL PJT, PTNL VGK, VHD, VTG, ZDA, HDT, AVR, ROT, Version 2.2 must be standard with the system
- GSOF(Binary) and RT17 streamed output must be standard with the system.
- The GPS receiver must have RTCM Output Version 2.2 available as a standard.
- The GPS receiver must support SAPOS as a standard
- The GPS receiver must support Virtual Reference Stations as a standard
- The GPS receiver must accept and support CMR2 and CMR+ as a standard
- The GPS receiver must support single event marking (standard) and dual event marking

Documentation

- The GPS receiver must come with an Operation manual for receivers.
- Other documentation for operation of the receivers must also be included.

ITEM #3: GPS campaign RTK upgrade.

This includes Data Collector, GPS antenna, Backpack, Base UHF radio modem, internal rover UHF radio, Radio antenna.

Data Collector Specifications:

Power . . . . . Internal 3800 mAh NiMH rechargeable battery pack
Battery life of 30 hours under normal operating conditions
Complete recharge in under three hours
Size . . . . . 25.8 cm (10.2 in) × 13 cm (5.1 in) × 5.2 cm (2.1 in)
7.4 cm (2.9 in) at handgrip
Weight. . . . . 990 gm (2.2 lb) including battery
Certification. . . . . FCC class B, CE Mark, CSA, and C-tick approval
Serial Port I/O. . . . . 9-pin serial port—RS232 (115 kB/s),
COM1 with 5 V (250 mA) on pin 9
MultiPort I/O . . . . . 26-pin MultiPort—RS232, COM2, Ethernet 10BaseT,
USB client, power in/out and audio in/out
0-Shell Lemo
RS-232 (115 kB/s)
Processor . . . . . Intel StrongARM SA-1110 @ 206 MHz
Memory . . . . . 512 MB non-volatile flash disk; 64 MB SDRAM
Display . . . . . 320 × 240 pixels (1/4 VGA) reflective color TFT,
frontlight Iluminated display
Touch Screen. . . . . Passive touch screen, works with stylus or finger
Keyboard. . . . . 57-key tactile action with separate navigation,
alpha and numeric keypads
Audio . . . . . Integrated speaker and microphone

Environmental

Temperature:
Operating . . . . . –25 °C to 60 °C (–13 °F to 140 °F)
Storage . . . . . –30 °C to 60 °C (–22 °F to 140 °F)
Water . . . . . ICE 529, IP 67, sealed against temporary immersion
Drop . . . . . 1.22 m (4 ft) to concrete on all faces, edges and corners
Sand and Dust . . . . . ICE 529, IP 6X and MIL-STD-810E, Method 510.3
Vibration . . . . . MIL-STD-810E, I-3.4.9 category 10, Fig 16 and 17
Altitude . . . . . MIL-STD-810E, Method 500.3

GPS Antenna Specifications:

- Dimensions: 16.2 cm diameter × 5.7 cm (6.4 in × 2.25 in) maximum depth
- Weight: 0.45 kgs (1 lb)
- Operating temperature range: –40 °C to +70 °C (–40 °F to 158 °F)
- 100% humidity proof, fully sealed
- The GPS antenna meets the following environmental standards:
  - MIL-810-F Figure 514 5c-17 vibration levels on each axis
  - Shock tested to MIL-810-F Table 516.5-I to survive a 2 m (6.56 ft) drop
- 4-point antenna feed for sub-mm phase center repeatability.
- Integral Low Noise Amplifier

- 50 dB antenna gain
- Phase Center Repeatability <1 mm horizontal

Base UHF radio modem specifications:

FEATURES

- Selectable 20-channel capacity
- Rugged weatherproof construction
- Configurable from front panel, survey controller, or from supplied WinFLASH utility on your computer
- Up to 15 km line-of-sight range
- Same unit can function as base station, repeater station, or rover receiver
- Selectable power outputs of 2 W, 10 W, or 25 W
- Programmable channel spacing of 12.5 kHz or 25 kHz
- Built-in channel selector
- Supports up to two repeaters in a network
- 4800, 9600 and 19200 baud rate over the air
- Retrievable/storable radio diagnostic information

BASE/REPEATER

Physical

Size . . . . . 12.5 cm W x 22.9 cm D x 7.9 cm H (4.9" W x 9.0" D x 3.1" H)
Weight . . . . . 1.59 kg (3.5 lb)

Electrical

Power:
Input . . . . . 12 V DC to 16 V DC, nominal
Connectors:
Power . . . . . 2-pin LEMO (+VDC, GND)
Data . . . . . 7-pin female LEMO (supports RXD, TXD and SGND)
Antenna . . . . . TNC female

Environmental

Temperature:
Operating . . . . . –40 °C to +65 °C (–40 °F to +149 °F)
Storage . . . . . –55 °C to +75 °C (–67 °F to +167 °F)
Humidity . . . . . 100%, fully sealed, weatherproof

TECHNICAL SPECIFICATIONS

Transmit Power . . . . . 2 W, 10 W, 25 W
Wireless Data Rate . . . . . 4800 bps, 9600 bps, 19200 bps
Frequency Bands . . . . . 410–420 MHz, 430–450 MHz, or 450–470 MHz (Only one band per radio modem)
Channel Spacing . . . . . 12.5 kHz or 25 kHz (Only one spacing per radio modem)
Number of Channels . . . . . Can be ordered with up to 20 programmed frequencies, internally stored
RF Modulation Format . . . . . Gaussian Minimum Shift Keying (GMSK)
Range (typical)
25 W Base . . . . . 10 km to 12 km (6 miles to 7 miles)
2 W Repeater . . . . . 5 km to 8 km (3 miles to 5 miles)

Power Consumption Voltage Current Nominal Load
2 W mode 12.6 V 0.8 A ~10 W
10 W mode 12.6 V 3.6 A ~45 W
25 W mode 12.6 V 8.0 A ~75 W
Serial Port . . . . . One set of RS-232 signals available.
Data is 8 bits with selectable parity and 1 stop bit.
Supported data rates are 9600 bps, 19200 bps, and 38400 bps5

Standard antenna

0 dB UHF omni whip 47 cm (18.5 in) 0.5 kg (1.1 lb)
5 dB UHF omni whip 99 cm (39 in) 0.5 kg (1.1 lb)